

Optics and Spectroscopy (English translation of Optika i Spektroskopiya) 2014 vol.116 N6, pages 897-905

Multipole interactions in a LiTmF₄ single crystal

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Abstract

We have considered magnetic and magnetoelastic characteristics of a van Vleck paramagnet LiTmF₄ taking into account the interaction between thulium ions via the phonon field. We have calculated parameters of the multipole interaction that is caused by the interaction of Tm³⁺ ions with dynamic lattice deformations of the B_g symmetry. We have presented a self-consistent description of previously published results of measurements of temperature dependences of elastic constants and the nonlinear Zeeman effect in the optical spectrum of the LiTmF₄ single crystal, as well as dependences of the magnetostriction on temperature, magnitude, and direction of the external magnetic field. © 2014 Pleiades Publishing, Ltd.

<http://dx.doi.org/10.1134/S0030400X14060198>
